

## Abstract

The present invention provides a "solid" diamond, i.e. greater than  $5\mu$  thick, electron emitter that has been "machined" using non-contact techniques to a point having a radius of less than about  $100\mu$ , preferably below about  $10\mu$  and most preferably between about 3 angstroms and about  $3\mu$ . The solid diamond electron emitters of the present invention can perform, even at these small radii, as multi-point emitters depending upon the radius and roughness of the pointed tip and can be used in arrays to obtain relatively large area field emitters for applications where such larger field emissions are necessary. Production of the solid diamond emitters of the present invention is preferably accomplished using non-contact electron or ion beam machining techniques. Residual gas analyzers (RGA) and field emitter extractor gauge analyzers (FERGA) that use the solid diamond emitters are also described.